

Standard Pipe Sizes

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Except for specialist applications, commercially available pipe comes in standard sizes. Pipes in a variety of materials - including carbon steel, steel alloys, as well as some plastics - are manufactured in these standard sizes.

The pipe size is specified with two numbers: the nominal pipe diameter (or bore) and the pipe schedule. This then sets the outside pipe diameter, the wall thickness (and hence the internal diameter). A list of common standard pipe sizes are given below.

A Table of the Most Common Standard Pipe Sizes

Nominal Bore 1/2 inch (DN 15 mm), Outside Diameter 21.34 mm

Schedule	Sch. 5	Sch. 10	STD	XS	Sch. 160	XXS
Wall Thickness (mm)	1.65	2.11	2.77	3.73	4.78	7.47
Internal Diameter (mm)	18.04	17.12	15.80	13.90	11.78	6.40

Schedule 40 has same dimensions as STD. Schedule 80 has same dimensions as XS.

Nominal Bore 3/4 inch (DN 20 mm), Outside Diameter 26.67 mm

Schedule	Sch.5	Sch. 10	STD	XS	Sch.160	XXS
Wall Thickness (mm)	1.65	2.11	2.87	3.91	5.56	7.82

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[Liquids Pressure Drop Spreadsheet](#)

[Tutorial on pressure drops](#)

[Tutorial on gravity flow](#)

Internal Diameter (mm) 23.37 22.45 20.93 18.85 15.55 11.03

Schedule 40 has same dimensions as STD. Schedule 80 has same dimensions as XS.

Nominal Bore 1 inch (DN 25 mm), Outside Diameter 33.40 mm

Schedule	Sch. 5	Sch. 10	STD	XS	Sch. 160	XXS
Wall Thickness (mm)	1.65	2.77	3.38	4.55	6.35	9.09
Internal Diameter (mm)	30.1	27.86	26.64	24.3	20.7	15.22

Schedule 40 has same dimensions as STD. Schedule 80 has same dimensions as XS.

Nominal Bore 1.5 inch (DN 40 mm), Outside Diameter 48.3 mm

Schedule	Sch. 5	Sch. 10	STD	XS	Sch. 160	XXS
Wall Thickness (mm)	1.7	2.8	3.7	5.1	7.1	10.2
Internal Diameter (mm)	45.0	42.7	40.9	38.1	34.0	27.9

Schedule 40 has same dimensions as STD. Schedule 80 has same dimensions as XS.

Nominal Bore 2 inch (DN 50 mm), Outside Diameter 60.3 mm

Schedule	Sch. 5	Sch. 10	STD	XS	Sch. 160	XXS
Wall thickness (mm)	1.7	2.8	3.9	5.5	8.7	11.1
Internal Diameter (mm)	56.9	54.7	52.5	49.3	42.9	38.1

Schedule 40 has same dimensions as STD. Schedule 80 has same dimensions as XS.

Nominal Bore 3 inch (DN 80 mm), Outside Diameter 88.9 mm

Schedule	Sch. 5	Sch. 10	STD	XS	Sch. 160	XXS
Wall thickness (mm)	2.1	3.0	5.5	7.6	11.1	15.2
Internal Diameter (mm)	84.7	82.9	77.9	73.7	66.7	58.5

Schedule 40 has same dimensions as STD. Schedule 80 has same dimensions as XS.

Nominal Bore 4 inch (DN 100 mm), Outside Diameter 114.3 mm

Schedule	Sch. 5	Sch. 10	STD	XS	Sch.120	Sch. 160	XXS
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Wall thickness (mm)	2.1	3.0	6.0	8.6	11.1	13.4	17.1
Internal Diameter (mm)	110.1	108.3	102.3	97.1	92.1	87.5	80.1

Schedule 40 has same dimensions as STD. Schedule 80 has same dimensions as XS.

Nominal Bore 5 inch (DN 125 mm), Outside Diameter 141.3 mm

Schedule	Sch. 5	Sch. 10	STD	XS	Sch. 120	Sch. 160	XXS
Wall thickness (mm)	2.8	3.4	6.6	9.5	12.7	15.9	19.0
Internal Diameter (mm)	135.7	134.5	128.1	122.3	115.9	109.5	103.2

Schedule 40 has same dimensions as STD. Schedule 80 has same dimensions as XS.

Nominal Bore 6 inch (DN 150 mm), Outside Diameter 168.3 mm

Schedule	Sch. 5	Sch. 10	STD	XS	Sch. 120	Sch. 160	XXS
Wall thickness (mm)	2.8	3.4	7.1	11.0	14.3	18.3	22.0
Internal Diameter (mm)	162.7	161.5	154.1	146.3	139.7	131.7	124.3

Schedule 40 has same dimensions as STD. Schedule 80 has same dimensions as XS.

Nominal Bore 8 inch (DN 200 mm), Outside Diameter 219.1 mm

Schedule	Sch. 5	Sch. 10	Sch. 20	Sch. 30	Sch. 40	Sch. 60	Sch. 80
Wall thickness (mm)	2.8	3.8	6.4	7.0	8.2	10.3	12.7
Internal Diameter (mm)	213.5	211.5	206.3	205.1	202.7	198.5	193.7
Schedule	Sch. 100	Sch. 120	Sch. 140	Sch. 160	XXS		
Wall thickness (mm)	15.1	18.2	20.6	23.0	22.2		
Internal Diameter (mm)	188.9	182.7	177.9	173.1	174.7		

Nominal Bore 10 inch (DN 250 mm), Outside Diameter 273.0 mm

Schedule	Sch. 5	Sch. 10	Sch. 20	Sch. 30	Sch. 40	Sch. 60	Sch. 80
Wall thickness (mm)	3.4	4.2	6.4	7.8	9.3	12.7	15.1
Internal Diameter (mm)	266.2	264.6	260.2	257.4	254.4	247.6	242.8
Schedule	Sch. 100	Sch. 120	Sch. 140	Sch. 160	XXS		
Wall thickness (mm)	18.2	21.4	25.4	28.6	25.4		
Internal Diameter (mm)	236.6	230.2	222.2	215.8	222.3		

Nominal Bore 12 inch (DN 300 mm), Outside Diameter 323.9 mm

Schedule	Sch. 5s	Sch. 5	Sch. 10	Sch. 20	Sch. 30	Sch 40s	Sch. 40
Wall thickness (mm)	4.0	4.2	4.6	6.4	8.4	9.5	10.3
Internal Diameter (mm)	315.9	315.5	314.7	311.1	307.1	304.9	303.3
Schedule	Sch. 60	Sch. 80	Sch. 100	Sch. 120	Sch. 140	Sch. 160	
Wall Thickness (mm)	14.3	17.5	21.4	25.4	28.6	33.3	
Internal Diameter (mm)	295.3	228.9	281.1	273.1	266.7	257.3	

Nominal Bore 14 inch (DN 350 mm), Outside Diameter 355.6 mm

Schedule	Sch. 5s	Sch. 10S	Sch. 10	Sch. 20	Sch. 30	Sch 40	XS
Wall thickness (mm)	4.0	4.8	6.4	7.9	9.5	11.1	12.7
Internal Diameter (mm)	347.7	346.0	342.9	339.8	336.6	333.3	330.2
Schedule	Sch. 60	Sch. 80	Sch. 100	Sch. 120	Sch. 140	Sch. 160	
Wall Thickness (mm)	15.1	19.1	23.8	27.8	31.8	35.7	
Internal Diameter (mm)	325.4	317.5	308.0	300.0	292.1	284.2	

STD has same dimensions as Schedule 30.

Nominal Bore 16 inch (DN 400 mm), Outside Diameter 406.4 mm

Schedule	Sch. 5s	Sch. 10S	Sch. 10	Sch. 20	Sch. 30	Sch 40	
Wall thickness (mm)	4.2	4.8	6.4	7.9	9.5	12.7	
Internal Diameter (mm)	398.0	396.8	393.7	390.6	387.4	381.0	
Schedule	Sch. 60	Sch. 80	Sch. 100	Sch. 120	Sch. 140	Sch. 160	
Wall Thickness (mm)	16.6	21.4	26.2	31.0	36.5	40.5	
Internal Diameter (mm)	373.1	363.5	354.0	344.5	333.4	325.4	

STD has same dimensions as Schedule 30. XS has the same dimensions as Schedule 40.

Pipe Diameters

There are two common pipe size standards: the American (ANSI/ASME/API) standard, which is in imperial units, and the European (DIN) system which uses metric units. In the American system, the pipe diameter is known as "Nominal Pipe Size" (NPS) or "Nominal Bore" (NB). In the European system, it is known as the "Nominal Diameter" (DN). The most common standard diameters are as follow: 0.5 inch (15 mm), 0.75 inch (20 mm), 1 inch (25 mm), 1.5 inch (40 mm), 2 inch (50 mm), 3 inch (80 mm), 4 inch (100 mm), 6 inch (150 mm), 8 inch (200 mm), 10 inch (250 mm), 12 inch (300 mm), 14 inch (350 mm), 16 inch (400 mm), 18 inch (450 mm), 20 inch (500 mm), 22 inch (550 mm) and 24 inch (600 mm) - further sizes up to 36 inch are also available. It should be noted that some intermediate standard pipe sizes are available commercially, such as 5 inch (125 mm), however these are less common.

For pipe sizes with a NB of 14 inch (DN 350 mm) and above, the nominal bore is the same as the pipe Outside Diameter (OD). Confusingly, for pipe sizes with a NB of 12 inch (DN 300 mm) and below, the nominal bore and outside diameter are different. For example, a pipe with a 12 inch NB (DN 300 mm) has an OD of 12.75 inches, or 324 mm.

Pipe Schedule

The pipe schedule sets the pipe wall thickness. Obviously increasing the wall thickness of the pipe increases the mechanical strength of the pipe, allowing it to handle higher design pressures. The following pipe schedules are available (in order of increasing wall thickness): 5S, 10S, 10, 20, 30, 40S, STD, 40, XS (Extra Strong), 60, 80, 100, 120, 140, XXS (Double Extra Strong) and 160. So for pipe of 12 inch NB (DN 300 mm) with a pipe schedule 5S, has a wall thickness of 0.156 inches (4 mm) . As the schedule is increased, so does the wall thickness. At a pipe schedule of 160, a 12 inch NB pipe has a wall thickness of 1.312 inches (33.3 mm). It should be noted that not all pipe schedules are available for all pipe sizes.

Calculation of Pipe Internal Diameter (ID)

For process engineers, the most important information is the pipe Internal Diameter (ID), as this is used in line sizing calculations. As was discussed above, for a given Nominal Bore or Diameter, the pipe OD remains constant. Thus as the pipe schedule changes, the internal diameter of the pipe changes. A spreadsheet for calculating pressure drops (in liquids) is given [here](#).

The ID can be easily calculated, as long as the pipe NB / DN and schedule are known. The pipe ID is given by the pipe NB minus double the pipe wall thickness (which can be obtained from the pipe schedule).

For example, for a 12 NB (DN 300 mm) pipe, schedule 40, the OD and wall thickness are respectively 12.75 inches (324 mm) and 0.406 inches (10.4 mm). Thus:

Pipe ID = 12.75 inches - 2 x 0.406 inches = 11.94 inches, or

Pipe ID = 324 mm - 2 x 10.4 mm = 303.2 mm

It is worth bearing in mind that wall thicknesses come within a specified tolerance, depending on the engineering standard used - a typical wall thickness tolerance is 12.5%. This means that the actual internal pipe diameter may vary slightly from that quoted above.